

DevOps for Communications Service Providers

Driving agility, efficiency, and higher revenue growth

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Executive Summary

Web companies such as Amazon Web Services and Google are well known for using continuous delivery to innovate faster and provide their customers with enhanced products in a timely manner. The need to push out new features with minimal manual intervention is growing increasingly important to non-web companies as well, with continuous delivery gaining ground in all sectors.

DevOps is a key methodology that brings developers and operations together, reducing friction and increasing velocity. And, because it relies so heavily on increased communication, collaboration and innovation, DevOps can also be a catalyst for cultural change within an organization.

While the benefits of continuous delivery for web companies are well known, other industries can benefit from DevOps as well, especially those with the following characteristics:

- Progressive softwarization of the tools
- A lean operational model
- Repetitive processes that can be automated

Communication Service Providers (CSPs) are perfect candidates to take advantage of DevOps. With the progressive adoption of new technologies such as Network Functions Virtualization (NFV) and software-defined networking (SDN), CSPs have the necessary infrastructure flexibility. With everything software-based (or at least software-managed), CSPs can re-write and fully automate many of their existing business processes, helping them gain a competitive edge.

Introduction

DevOps introduces the organization, tools, processes, and culture that enable service development and operational teams to collaborate, dramatically accelerating the development-to-deployment process and allowing CSPs to continuously deliver innovations and compete with over-the-top (OTT) players. With DevOps, new services can be created and offered in days, perhaps even minutes, rather than months and years.

To fully realize the benefits of SDN and NFV, however, executives at CSPs must accelerate the adoption of DevOps principles in their organizations. The foundational elements CSPs need to implement DevOps include infrastructure that enables the adoption of virtualization; open APIs across multiple layers; analytics for quick feedback; programming skills; an organizational design without boundaries; and, finally, a culture that embraces risk taking and collaboration.

Keeping Pace with Innovation

In their private lives and at work, apps are changing the way people interact and communicate. They are tapping into new ways to reach customers, driving new buying decisions, and enabling companies to increase their competitive advantage. When Apple's App Store opened in 2008, it had about 500 applications; as of January 2015, Apple revealed the number was more than 1.4 million, and that number is increasingly exponentially. When you think that Google Play hosts even more, you get some idea of the scale of this competitive industry¹.

Apps are also changing consumer expectations. Users expect apps to work right the first time. According to a Digital Trends article,² "while 79 percent of users will give an app a second chance after it failed to impress them on the first go, that number plummets to just 16 percent that will go back for a third attempt." Users also expect apps to be continually improved. For example, a 2014 survey found that the average number of days between version updates for the top 25 iOS apps ranges from under five days to a maximum of slightly less than 60 days³. Without DevOps teams, it would be difficult to manage that speed of innovation.

Remember Joyn?

Apps are also changing the nature of software development. Consider the progress of two different communications initiatives. Remember Joyn? Conceived in 2007 by a group of leading telecom players, it defined, tested, and integrated voice and data services in the Rich Communication Suite. By February 2013, it had an estimated 15 million users⁴.

Contrast this with WhatsApp, the communications app that uses Wi-Fi or the data channel to allow users to message and call each other. Dreamed up by a team of entrepreneurs in early 2009, the first version was released in March of the same year. Although it offered limited functionality at the time, that functionality steadily improved and the app took off, but still without a clear business model.

¹Source: Apple App Store versus Google Play: Here comes the next battle in the app wars, ZDNet article, January 2015

²Source: Are you a rarity? Only 16 percent of people will try out an app more than twice, Digital Trends, March 2013

³25 Top iOS Apps and Their Version Update Frequencies, SensorTower, April 2014

⁴Source: Operators start to doubt that Joyn is the answer while customers continue to use over-the-top, Global Telecoms Business, August 2013

In August 2014, however, WhatsApp announced it had more than 600 million active users, having been acquired by Facebook in February that year for \$16 billion due to its growing importance in connecting people. The message is clear: Speed to market is essential. Offering an early version with a limited set of valuable features, followed by continuous improvements that respond to the dynamics of the market and evolving customer needs, is a better route to success than delaying until everything users could possibly want is included.

Barriers to Success

The problem for communications services providers is how to gain the necessary agility to fulfill these requirements while working in an environment that has traditionally been hardware-centric.

Typically, CSPs work with fixed data centers, connections, and routers, as well as standalone network appliances and software. However, the adoption of NFV and SDN introduces a flexible architecture that applies simplification, automation, and analytics to achieve operational benefits by reducing the costs associated with complex, manual processes.

CSPs must also contend with proprietary systems and applications, as well as siloed organizations. This all adds up to slow time-to-market for new services and enhancements to existing ones. How can these barriers be overcome? The answer is DevOps.

DevOps Methodology

Simply put, DevOps is an IT best practice that brings together teams of developers and operations professionals to rapidly and iteratively develop and implement new products and services.

Legacy waterfall development focuses on defining and then delivering all the requirements of an application. It involves discrete stages, each of which must be completed sequentially, and highly defined roles. Development is extremely lengthy and, in many cases, by the time applications are delivered, customer requirements have changed and the market has moved on.

In addition, the traditional plan-build-operate service life cycle that CSPs follow takes too long, due to the need for time-consuming development and testing over a complex infrastructure. Moving towards a DevOps methodology and open platforms for service delivery will help CSPs accelerate the launch of new services and innovation cycles.

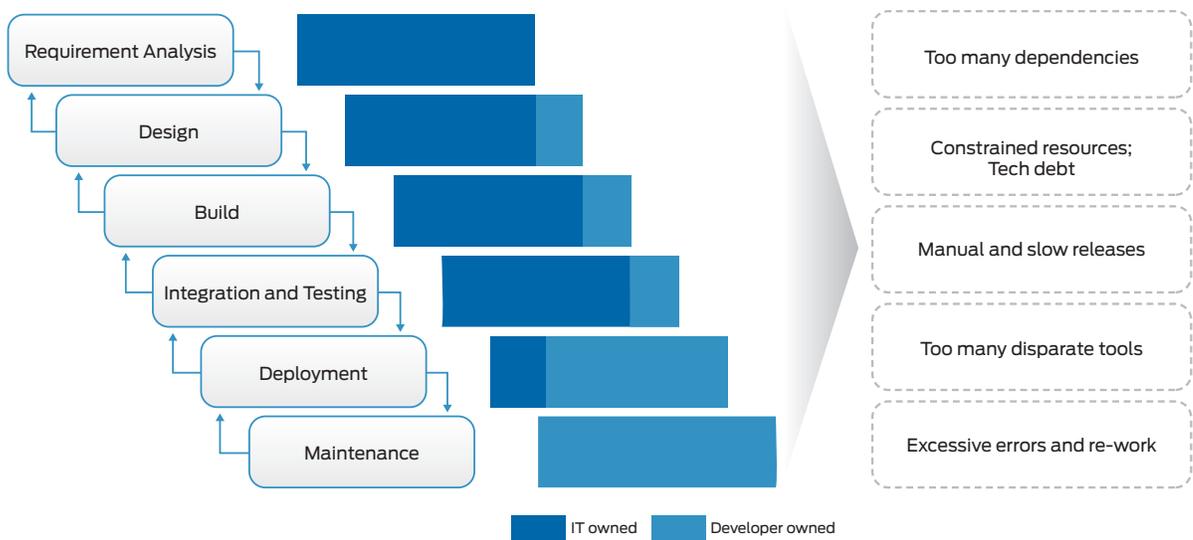


Figure 1: Waterfall product development process

DevOps, on the other hand, is an agile methodology that delivers features incrementally. Because it involves developers and operational professionals working side-by-side, ideas are quickly shared, decisions are made and actions taken, problems are corrected, and functionality is delivered much faster than traditional methods, leading to a significantly shorter time-to-market.

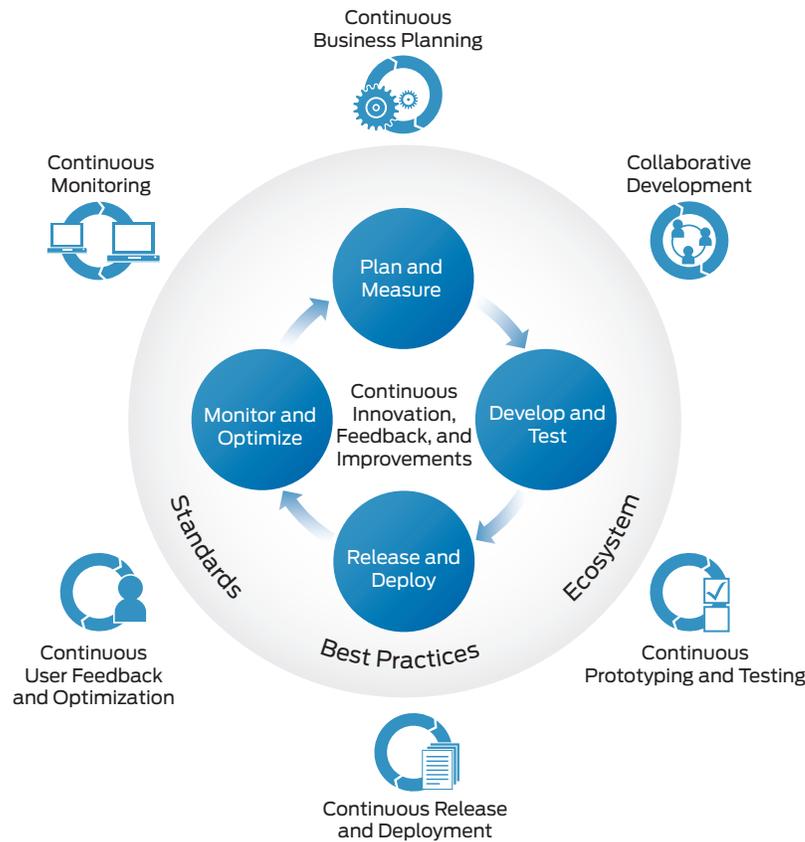


Figure 2: DevOps product development model

Also, because the methodology has constant user feedback at its heart, it not only provides continuous improvements, it also consistently delivers functionality that meets user requirements, as opposed to phasing user feedback into releases that take six to nine months to appear.

Within CSPs, service creation involves many different teams: marketing, network engineering and planning, operations and business support systems (OSS/BSS) IT groups, operations, and others. By adopting DevOps principles, the service creation process can be streamlined and, with the progressive migration towards virtualized environments, DevOps will become mandatory.

Benefits

Such is the power of DevOps that it is becoming widely adopted by companies around the globe. It's not difficult to see why; research conducted by Rackspace⁵ has found that companies that adopt DevOps realize the following benefits:

- 57% higher customer satisfaction
- 57% lower IT infrastructure spend
- 49% lower downtime/failure rate
- 46% higher customer engagement
- 46% higher sales

While CSPs are driving DevOps adoption, transforming the legacy infrastructure and addressing the large hardware infrastructure business will require CSPs to adopt a more sophisticated operating model that must balance the old and the new. With no legacy businesses and no transport infrastructure, new age tech companies can relatively easily adopt a DevOps model for their entire business.

⁵DevOps Adoption Research, by Rackspace, October 2014

Making the Transition

Clearly, telecom companies can gain significant benefits by moving to DevOps. Making the transition from a hardware-focused model to a software-centric model, however, is not easy. At Juniper Networks, we believe it will require three key steps:

1. First, as many applicable manual network engineering tasks and workflows as possible should be abstracted and delivered via a Network-as-a-Service (NaaS) layer. All future business and engineering collaboration should be conducted on a DevOps-compliant service delivery platform that interfaces with the physical and virtual network functions.
2. Second, manual network engineering tasks (site survey, construction, etc.) that can't meet DevOps requirements should be separated and delivered outside the DevOps-compliant platform. The transition to a converged IP network will make the non-DevOps-friendly operations smaller over time and enable abstraction and DevOps compliance.
3. Third, the rest of the CSP organization (all virtualized assets and strategic operations) will need to leverage SDN and adopt DevOps best practices for tighter coordination between IT and network operations.

DevOps-Based Cloud CPE

Many providers that offer enterprise services today deploy dedicated physical customer premises equipment (CPE) to provide the contracted services. Any change to the services will force the CSP to install new CPE. This is not only a manual process, it is time consuming, costly and complex to deploy, maintain and evolve. Virtualizing the CPE provides multiple advantages.

In today's Web-centric world, end users expect personalization and more hands-on control over their agile service environment. They want the ability to access their network services through a portal that lets them add, drop or change these services on demand and with rapid delivery. In short, end-users want simplicity, reliability and complete control over their network services.

With the Juniper Cloud CPE solution, CSPs roll out generic infrastructure and all service-specific components are virtualized, offering the required flexibility in those environments. This new model simplifies service creation, automates service delivery to improve operational efficiency, and increases revenue-generating capabilities, all at scale.

Today's Manual and Sequential CPE Provisioning

1. The ordering process is manual and takes longer.
2. Each customer site requires its own dedicated appliances, such as firewalls. CSPs require the enterprise customer's IT organization to be staffed with dedicated network engineers who need to be well versed on the latest and greatest network technology. It can be costly to hire, retain and continuously train these resources.
3. Overall process can be expensive to deploy and maintain.

DevOps-Based Automated vCPE Provisioning

1. The enterprise site has a generic CPE device. All network functions such as firewall and WAN management are virtualized and hosted on-site, at the SP edge or data center.
2. Most of the ordering, provisioning and management process is automated and moved to a DevOps-compliant service delivery platform.
3. The DevOps-based architecture allows for centralized, scalable and flexible service provisioning.

How DevOps Is Helping Tech Companies

30 minutes

After adopting DevOps, the average node provisioning time at PayPal was reduced from three weeks to just 30 minutes. According to a PuppetLabs report, PayPal is also well on its way to delivering code from a developer's desktop to production in less than an hour—a dramatic improvement that will sharpen the company's competitive edge.

Source: [Cloud Automation: PayPal's OpenStack Secret Sauce](#), PuppetLabs, 2013

45 minutes

At AOL, the average code deployment time dropped from six hours to just 45 minutes after adopting DevOps.

Source: [5 KPIs that Make the Case for DevOps](#), PuppetLabs, 2013

0.001

At Amazon Web Services (AWS), DevOps adoption was one of the key factors that contributed to the overall failure rate of less than 0.001%.

How Juniper Can Help

Automation and orchestration are key components of successful DevOps methodologies. Automation helps simplify repeatable manual tasks through scripts and other software tools. Orchestration is an extension of automation that groups related automated tasks into workflows. To seamlessly integrate our products into automation and orchestration solutions, Juniper Networks provides a growing number of feature-rich tools, standard programmable APIs, and protocols across all platforms.

Juniper Networks® Junos® operating system is at the heart of Juniper's solutions for helping CSPs become more software-centric. It provides automation tools that execute repeatable manual tasks at speed to reduce errors and achieve scale-of-service delivery. At the same time, Junos OS integrates seamlessly with popular orchestration frameworks used to establish DevOps in IT and service delivery environments.

Where a Juniper Networks product does not provide the functionality required in a DevOps environment, Junos OS offers interfaces, protocols, or APIs to facilitate integration with best-in-class automation frameworks such as Puppet, Chef, Python, and Ansible. With a growing need to integrate DevOps methodologies with IT orchestration frameworks such as OpenStack, Junos OS also supports Neutron plug-ins.

SDN applications using OpenFlow or standardized routing protocols extend network application development in Junos OS to a new level, with a truly extensible automation platform providing support for native scripting languages such as Python and Ruby, seamless application development, and integration with a programming language-independent development environment utilizing Netconf/Yang, Yang data models, and RESTful APIs, to name just a few.

In addition to our own and third-party products, Juniper offers automation capabilities across the three different phases of the overall customer network life cycle: planning, building, and operating the network.

Automation

Junos OS automation consists of a suite of tools used to automate operational and configuration tasks on Junos OS-based network devices. These tools leverage the native XML capabilities of Junos operating system and include commit scripts, operations (op) scripts, event policies, event scripts, and macros for on-box automation.

Junos OS automation simplifies complex configurations and reduces potential configuration errors, saving time by automating repetitious operational and configuration tasks. It also speeds troubleshooting and maximizes network uptime by warning of potential problems and automatically responding to system events. Junos OS automation can also capture the knowledge and expertise of experienced network operators and administrators, allowing a business to leverage this combined expertise across the organization—all potential DevOps benefits.

SDN Controllers and Orchestrators

Juniper Networks Contrail and OpenContrail SDN controllers add value to DevOps methodologies through the automation and orchestration of virtualized network functions (VNFs) and physical network functions (PNFs) in service creation through service chains. With tight integration of OpenStack, these products also provide a platform for the rapid deployment of services with optimized cost and reduced time-to-market, adhering to DevOps concepts.

Juniper Contrail Service Orchestration simplifies and automates the design and implementation of custom service creation and delivery through an open framework for complete service life cycle management. This gives operators a powerful network service designer application, enables robust administration management and troubleshooting, and creates a customer service marketplace that completely orchestrates service life cycles.

Conclusion

Juniper Networks consultants can engage at various levels in your automation journey, whether to assess the best strategy and approach to automate network processes or to design, build, or implement automation in the network to achieve the speed, agility, and scale the business demands.

Staffed by experts well versed in helping CSPs make the transition to DevOps, Juniper Networks Professional Services can help businesses successfully transform their infrastructure, management, people, and processes with proven engagement models that mitigate risks, accelerate solution adoption, and help realize the ROI of automation sooner.

If you're not sure where to start, Juniper's Automation Discovery Workshop can help. This two-day onsite workshop, run by a senior Professional Services consultant, delivers an overview of the various Juniper and third-party automation products, and it provides examples of how these might be used to automate aspects of the plan, build, and operate life cycle.

For More Information

For more information about how Juniper can help you adopt DevOps, please contact your Juniper account representative, visit Juniper Networks online at www.juniper.net, or consult the following assets:

- [Navigating a Strategic Approach to Transformation](#) white paper from Heavy Reading
- [Network Transformation with NFV and SDN](#) white paper
- Juniper Networks [Big NFV Idea](#) web page

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at [Juniper Networks](#) or connect with Juniper on [Twitter](#) and [Facebook](#).

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